

5.0 THE TENTATIVELY RECOMMENDED PLAN

5.1 PLAN DESCRIPTION

Under Alternative 2, the Tentatively Recommended Plan, wetlands would be restored in the HAAF, SLC and BMK parcels using dredged material and natural sedimentation. Before dredged material is placed in the area, perimeter levees would be constructed. The bayward levee would be breached after dredged material placement. Although wetlands on all parcels would be restored, the HAAF will be hydrologically separated from the SLC and BMK parcels because of the need to continue operation and maintain access of the NSD outfall pipeline that will be re-constructed as part of the authorized HWRP.

5.1.1 Construction and Restoration Timing

Inclusion of the tentatively recommended plan for BMK expansion of the HWRP increases the estimated time to construct the combined areas to approximately 16 years including site preparation, placement of dredged material and breaching the outboard levees.

5.1.2 Site Preparation

Site preparation activities under the Tentatively Recommended Plan include: removing remaining buildings and structures; providing temporary drainage; relocating the NSD dechlorination plant; modifying the NSD outfall pipeline; installing and operating the hydraulic off-loader and piping to transport dredged materials to the HAAF and SLC parcels; constructing perimeter levees, berms, and internal peninsulas; placement and consolidation of dredged material; lowering the bayward levee; breaching the bayward levee; and cutting channel through outboard marsh.

To provide temporary drainage for rainfall and process water resulting from dredged material placement from the HAAF and SLC and BMK parcels, drainage weirs would be installed through the outboard levee. These weirs would be removed when the bayward levee is lowered.

As part of the expanded portion of the project, perimeter levees would separate the BMK-V restoration site from the BMK residential community, Pacheco Pond and the HAAF. Construction of an additional 2,200 feet of levee is currently authorized as part of the original HWRP to provide continued protection and access to the NSD wastewater pipeline. To achieve a long-term levee crest elevation of +8 feet NGVD, perimeter levees would be constructed to an elevation of +12 feet initially, to accommodate an estimated 4 feet of long-term settlement.

Levee construction techniques would provide adequate stability to withstand potential earthquake-induced ground failure. End-of-construction conditions necessary to satisfy the stability factor of safety would be met by constructing levees with side slopes of 3:1 (horizontal to vertical) or flatter, and by constructing toe berms on both sides of the

perimeter levees averaging 6 feet high and 50 feet wide. The perimeter levees would have a 200-foot-wide footprint. Over time, as the levee settles and the underlying bay mud consolidates and gains strength, the stability factor of safety would increase to a level well in excess of the required stability criteria. Please refer to the technical appendices of this report for additional information of levee design considerations.

As with the existing HWRP, internal peninsulas would also be constructed within the BMK portion of the expanded project area. The primary objective of the peninsulas is to reduce fetch and the potential for erosion of perimeter levees from wave action. The anticipated cross-sectional dimensions of the internal peninsulas, subject to final design changes, are shown in Appendix D.

5.1.3 Placement of Dredged Material

To allow the use of dredged material, an hydraulic off-loader would be placed in San Pablo Bay and piping would be installed to connect the off-loader to the HAAF parcel. The off-loader would be powered by either electricity or diesel and would likely remain in the same approximate location throughout the additional years needed to construct the BMK expansion to the project. Although the exact timing of delivery of dredged material to the off-loader is determined by the needs of the contributing dredging projects, the off-loader is intended to be operational and ready to pump ashore around the clock during the dredging season.

The off-loader would be properly marked and lighted, and the pipeline would be submerged and marked, consistent with U.S. Coast Guard regulations, to prevent navigational hazards to watercraft using the area at all times of the day and night. The U.S. Coast Guard would be notified to include an update on project activities in its Information Notice to Mariners.

Dredged material for the wetland restoration project could originate from many sources. One of the most likely sources is the Oakland Harbor navigation improvement project. Other potential sources of material include Bay new work and maintenance projects such as the Concord Naval Weapons Station, Southampton Shoal, Richmond Harbor, Port Sonoma, Bel Marin Keys, and Bahia Lagoon. Evaluating impacts associated with dredging and transporting material to the off-loader is assumed to be the responsibility of the sponsor of each dredging project. An EIR/EIS was recently completed on the Oakland Harbor navigation improvement project (U.S. Army Corps of Engineers and Port of Oakland 1998a, 1998b, 1998c, and 1998d). That document addressed impacts associated with transporting dredged material to the HAAF parcel and concluded that transporting material on barges would not result in significant impacts on the environment. Since the off-loader location in San Pablo Bay is not likely to change when dredged material placement activities shift to the BMK parcel, these conclusions hold for the expanded project as well.

The off-loading of dredged material would involve mixing the material with water to allow pumping. After the dredged material slurry is placed, the water would separate

from the material and would eventually be discharged to back San Pablo Bay. Certain options have been proposed that would ensure that the process water does not violate water quality standards when discharged to the bay. The most viable option is to hold the water in detention ponds within the restoration site for subsequent discharge.

Water quality standards will be specified in the wastewater discharge permits issued by the RWQCB. The discharge standards for the process water will meet RWQCB standards before water is discharged to the bay.

5.1.4 Lowering and Breaching the Bayward Levees

After individual drainage cells of the expanded project are filled to grade with dredged material the outboard levees will be breached in the location of the main tidal channel connecting the cell to San Pablo Bay. In conjunction with breaching, large sections of the outboard levees would be lowered to an elevation similar to the elevation of the marsh plain adjacent to the levee. However, some portions of the levees would remain at higher elevations to provide high tide refuge. In addition to levee breaching, a pilot channel will be cut to aid in the establishment of the main tidal channels serving each main tidal drainage basin. The excavated material from the pilot channel cuts would be placed within the restoration area.

Track-mounted excavators would likely be used to excavate the levee breaches. A 6- to 10-inch suction dredge mounted on a small barge would be used to excavate the pilot channels. Material excavated by the dredge would be pumped directly to the site. This method would limit the amount of coastal salt marsh disturbed during the dredging process. Regardless of the amount of dredged material actually placed, levee breaches would be completed no later than 8 years after site preparation begins on the individual tidal cells of the enlarged project to ensure that marsh establishment is not delayed. As stated in Article II.L. of the PCA, these breaches will be timed “to ensure that marsh establishment is not delayed, provided that the Government determines that each of the following is true in light of the state of completion of the construction features of the Project: (1) breach of the bayward levee does not cause undue risk of property damage to parcels of real property adjoining the Project site, (2) breach of the bayward levee does not cause undue risk of environmental harm to the Project site or the surrounding environment, and (3) breach of the bayward levee reflects sound engineering practice and judgment.”

5.1.5 Evolution of Site

The appearance of the site will evolve over time. Initially, the tidal section of the site will consist of subtidal and intertidal mudflat habitats. The incoming San Pablo Bay waters will introduce invertebrates that will rapidly colonize the intertidal mudflats, providing a food source for shorebirds and waterfowl. Bay waters will also introduce a variety of fish to the site such as chinook salmon, striped bass, green sturgeon, steelhead trout, staghorn sculpin, inland silversides, and Pacific herring. The tidal pannes will be present at the time of the breach as a result of site construction. These areas will provide

high tide refugia for shorebirds and gulls. It will take at least one full season to accumulate the salt deposits typical of the pannes and for the growth of vegetation around the fringe of the pannes.

As sediment builds, cordgrass will begin to colonize the site, followed by species such as pickleweed, jaumea, alkali heath, gumplant, and salt grass. The growth of vegetation will be accompanied by the development of the slough channel network. Channels will be broad and undefined at the time of the breach, developing more complexity as the marsh plain elevation increases. Tidal ponds, which were a feature of the historic landscape, are expected to form in the mature marsh.

Tidal pannes are the transitional habitats between areas that receive daily tidal action and non-tidal habitats; seasonal wetland, grassland, and upland. Seasonal wetlands will shallowly pond precipitation, and will have a mixture of areas that have minimal, low-growing vegetation and a drainage channel supporting taller, emergent vegetation such as cattail, bulrush, and some willows along the edge. Many of the bird species present in the tidal wetlands will also use the seasonal wetlands. Seasonal wetland invertebrate communities typically include zooplankton, aquatic beetles, bugs, and flies. Fish are not typically found in seasonal wetlands due to their seasonality and shallow depths. As the annual and perennial grassland and upland habitats mature, shrubs will voluntarily colonize the area.

5.2 SUMMARY OF BENEFITS

Alternative 2 has been chosen as the Tentatively Recommended Plan because it best meets the study purposes and the study goal. Alternative 2 creates the most wetland habitat value and provides the greatest benefits to endangered species. This alternative efficiently provides disposal capacity for approximately 13 million cubic yards of dredged material. It minimizes the impacts of aquatic disposal of dredged material in the bay and ocean.

The habitat benefits obtained from using dredged material to accelerate tidal marsh restoration are relatively expensive when compared to those obtained when creating tidal marsh using only natural sedimentation. However, using dredged material will substantially decrease the time necessary for the restored wetlands to become fully functional. This will accelerate the habitat benefits due to earlier creation of habitat for endangered species of high public and regulatory concern. These accelerated habitat benefits can be considered a free benefit of using an economically efficient method of upland disposal of dredged material, and are additionally supplemented by the unquantified benefits of avoiding aquatic disposal of this material. For these reasons, Alternative 2 best implements a number of federal, state, regional, and local plans, including the Long Term Management Strategy.

5.3 ENVIRONMENTAL REQUIREMENTS AND COMMITMENTS

5.3.1 Water Resources Council Environmental Requirements

The following page contains Table 5-1, which shows the Tentatively Recommended Plan compliance with the Water Resources Council environmental requirements. It references the statute concerned, the state of compliance and a description of those areas still being completed.

Table 5-1
Tentatively Recommended Plan Compliance with Water Resources Council
Environmental Requirements

Statute	Compliance	Description of Partial Compliance
Archeological and Historic Preservation Act of 1980. 16 USC 469, <i>et seq.</i>	Partial	The BMK parcel has been fully evaluated, however, the boundaries of the Bay Trail presented in Alternative 1 are outside the current parcel and require an additional survey. This work is currently in progress.
National Historic Preservation Act of 1966 16 USC 470, <i>et seq.</i>	Partial	The BMK parcel has been fully evaluated, however, the boundaries of the Bay Trail presented in Alternative 1 are outside the current parcel and require an additional survey. This work is currently in progress.
Clean Air Act of 1972 42 USC 7401, <i>et seq.</i>	Full	A BAAQMD permit may be required if diesel power is chosen.
Clean Water Act of 1972 33 USC 1251, <i>et seq.</i>	Partial	A preliminary 404(b)(1) report has been prepared. A Section 402 discharge permit will be obtained from the San Francisco Bay RWQCB.
Coastal Zone Management Act of 1972 16 USC 1451, <i>et seq.</i>	Partial	Once design is complete, a Consistency Determination will be prepared. BCDC has endorsed the project concept.
Endangered Species Act of 1973 16 USC 1531, <i>et seq.</i>	Partial	Consultation has begun. A BA is being prepared for the BMK parcel.
Estuary Protection Act of 1963 16 USC 1221, <i>et seq.</i>	Full	
Federal Water Project Recreation Act of 1965. 16 USC 460, <i>et seq.</i>	N/A	
Fish & Wildlife Coordination Act of 1958 16 USC 661, <i>et seq.</i>	Partial	The DCAR is scheduled to be completed by 30 August 2002. The FCAR will be finished after design is complete and ESA consultation concluded.
Land and Water Conservation Fund Act of 1965. 16 USC 460, <i>et seq.</i>	Full	
National Environmental Policy Act of 1969 42 USC 4321, <i>et seq.</i>	Full	The Draft SEIS/R is being circulated with this report.
Rivers & Harbors Act of 1899 33 USC 403, <i>et seq.</i>	Full	
Watershed Protection & Flood Control Act of 1954. 16 USC 1001, <i>et seq.</i>	Full	
Wild & Scenic Rivers Act of 1968. 16 USC 1271, <i>et seq.</i>	N/A	

5.3.2 NEPA Compliance

The project has been assessed through the NEPA and CEQA processes. The environmental impacts of the tentatively recommended plan and alternatives are assessed in the Supplemental Environmental Impact Statement/Report (SEIS/R).

5.3.3 Clean Water Act

A preliminary 404(b)(1) report has been prepared to assess impacts to wetlands and waters of the US and is included as Appendix B of the attached SEIS/R. A Section 402 discharge permit will be obtained from the San Francisco Bay RWQCB.

5.3.4 Fish & Wildlife Coordination Act

The FWS, under contract to the Corps, is in the process of reassessing the draft HWRP Coordination Act Report (DCAR) to include BMK. The updated DCAR is scheduled to be completed in August 2002 and will be included in the final GRR. The DCAR is expected to list concerns and recommendations for modification of project design.

5.3.5 Endangered Species Act

The Endangered Species Act (ESA) requires federal agencies whose action may affect endangered species to go through a specified consultation process. The Corps, in August 1998, requested from the FWS a list of proposed, threatened, and endangered species that may be present at the project site; the FWS provided the species list. Then the Corps prepared a Biological Assessment (BA) to analyze the effect of the project on listed species which may be present, in this case, California clapper rail and salt marsh harvest mouse. The BA (Jones & Stokes, August 1998) was submitted to FWS on August 24, 1998. The next step is for FWS to review the BA and then provide a Biological Opinion (BO). FWS has requested a programmatic consultation covering all actions at the authorized HWRP site and the proposed BMK site. A Biological Assessment (BA) regarding the authorized HWRP is currently under review by FWS; an additional BA is being prepared for the BMK parcel. The FWS has stated that a BO may be provided by late September.

5.3.6 Coastal Zone Management Act

Once design is complete, a Consistency Determination will be prepared. The responsible Coastal Zone Management Act (CZMA) agency, BCDC, has endorsed the project concept and has co-managed the project with the SCC.

5.3.7 Cultural Resources Compliance

Full compliance with the National Historic Preservation Act of 1966 and the Archaeological and Historic Preservation Act of 1980 has been achieved for the BMK parcel. The requirements of these acts include site surveys and coordination with the

State Historic Preservation Officer (SHPO). A detailed description of the actions taken to ensure cultural resources compliance is provided in Chapter 4 of the SEIS/R attached to this GRR. The boundaries of the Bay Trail alignment proposed in Alternative 1 are outside the boundary of the BMK parcel. Additional work is in progress to evaluate the cultural resources impact in this area.

5.3.8 Resources of Principal National Significance

Following is a table summarizing the effects of the tentatively recommended plan on Resources of Principal National Significance.

Table 5-2
Effects on Resources of Principal National Significance

Resource	Source of National Recognition	Description of Effects
Air quality	Clean Air Act	None
Sensitive coastal zone areas	Coastal Zone Management Act	Creates new tidal areas
Endangered & threatened species	Endangered Species Act	Increases habitat
Fish & wildlife	Fish & Wildlife Coordination Act	Increases habitat for wetland species
Floodplains	EO 11988 Floodplain Management	F-2 Zoning issues under examination
Historic and archeological properties	National Historic Preservation Act	None
Prime & unique farmland	CEQ Memorandum August 1, 1980	None in project area
Water quality	Clean Water Act	Temporary increase in turbidity during construction
Wetlands	Clean Water Act	Creates large new wetland area
Wild & Scenic rivers	Wild & Scenic Rivers Act	None in project area

5.3.9 Environmental Commitments

The following environmental commitments are in the tentatively recommended plan:

- a. The Corps has prepared a Clean Water Act Section 404(b)1 evaluation. In addition, State water quality certification will be obtained after Plans and Specifications (P&S) are completed and before the construction contract is awarded.
- b. Dredged material will meet LTMS sediment suitability standards.
- c. Threatened and endangered species will be protected during construction, under ESA requirements. The biological opinion will be provided before P&S are completed.
- d. The NSD outfall pipeline and NHP drainage facilities will be protected from adverse impacts due to construction.

5.4 REAL ESTATE REQUIREMENTS

The sponsor shall provide all lands, easements, rights of way, relocations and disposal sites (LERRDS) for the construction, operation, and maintenance of the Hamilton Army Airfield Wetland Restoration Project. This is in accordance with the provisions of the terms of Water Resources Development Act of 1986 (WRDA '86) and the Project Cooperation Agreement (PCA). The real estate requirements for this project are a total of 1,610 acres to be acquired for various project features; this includes the BMK parcel. The total value of these land rights has been estimated at \$18,150,000 including contingencies and administrative costs. (The real estate requirements are described in more detail in the Real Estate Plan, Appendix F of this GRR).

There are no Public Law 91-646 Relocations for the tentatively recommended plan, Alternative 2. There are no utilities being affected by this project that are considered to be relocations as defined in WRDA '86 and the PCA. The two facilities affected by the BMK-V expansion to the HWRP are the Novato Sanitary District (NSD) Outfall Pipeline and PG&E high voltage power line towers on the Vaca-Ignacio Line.

The replacement, relocation and/or improvement of the NSD Outfall Pipeline and the associated Dechlorination Plant are authorized in the existing HWRP. However, in BMK-V Alternatives 1 and 3 the proposed expansion of Pacheco Pond will likely require changing the alignment of approximately 2,200 feet of the outfall pipeline. This will extend the outfall pipeline by approximately 500 lineal feet and have an additional cost of approximately \$385,000. This action would be considered to be a utility relocation. These actions are compatible with the currently selected alternatives of replacing the outfall pipeline with a new plastic (HDPE) pipeline within the existing easement and relocating the Dechlorination Plant to the NSD treatment plants.

Five PG&E high voltage power line towers on the Vaca-Ignacio Line will be affected by all three BMK-V alternatives including one tower near Headquarters Hill and four towers along the northern property boundary adjacent to Novato Creek. The Corps and SCC had experience with towers in similar filled conditions and elevations on this same power line during the construction of the Sonoma Baylands Project. Based on that experience, only protection of these towers will likely be required. This will include protecting the lower portions of the steel towers with a concrete overlay to prevent corrosion and providing limited access to the towers. The cost of this protection and access is estimated at \$500,000 for Alternatives 1 and 2 and \$ 600,000 for Alternative 3.

5.5 ENGINEERING REQUIREMENTS

The engineering requirements of the tentatively recommended BMK expansion plan are addressed in the technical appendices of this report. The engineering appendices contains hydrologic and hydraulic studies, surveying and mapping provisions, geotechnical information, civil engineering information and project design considerations. Comparative studies, detailed investigation and design are expressed in sufficient detail and determine the recommended plan and its baseline estimate.

5.6 OPERATION, MAINTENANCE, REPAIR, REPLACEMENT, AND REHABILITATION REQUIREMENTS

A conceptual plan for operations, maintenance, and monitoring of the project after construction has been produced and is included in the Engineering Appendix D. This plan is summarized here. The conceptual plan will be greatly expanded and quantified in the detailed design phase of the study.

The plan covers the period after the completion of construction. At the beginning of restoration post construction phase, dredged material will have been placed and the bayward levee breached. Maintenance and monitoring during construction will be described in the plans and specifications for construction. Only dredged material qualified as suitable for wetland placement will be deposited on site.

After the completion of construction, operations and maintenance under the plan will include inspections and surveys of the levees and management of vegetation in upland and non-tidal wetland areas. Vegetation management will focus on creating and maintaining desired vegetation types and discouraging invasive exotic plant species.

Monitoring of biological, hydrological, topographic, bathymetric, and chemical conditions will track the evolution of the site after breaching of the bayward levee. Periodic comparisons of measured conditions with expected conditions will determine whether the development of the site is progressing as planned.

The Corps of Engineers will participate in the monitoring program for 13 years after the end of construction. This period was chosen because it would be approximately the halfway point of the post construction restoration process.

Normally, Corps monitoring of a non-reservoir project ends upon completion of construction. All further operations and maintenance, including monitoring of the project's structural integrity, are then the responsibility of the local sponsor. An exception may be made for monitoring of mitigation plantings, which may extend for five years beyond the end of construction.

This project will be constructed partially through natural sedimentation over a period of approximately 20 years, facilitated by breaching the outboard levee. This sedimentation process, and associated development of marsh vegetation and appropriate micro-topography, including tidal channels, is essential to completion of the project and ultimate success of the restored marsh as endangered species habitat. Proof that natural processes are indeed guiding maturation of the marsh as planned can only be established after substantial evidence is obtained that sedimentation, channel formation and vegetation are progressing properly. A typical Corps project five-year monitoring period would not be adequate to determine this outcome, as little marsh will have developed by that time. It is expected that a 13-year monitoring and adaptive management period should be adequate to establish the likely success of the project. Seventy-five percent of

the new tidal marsh habitat is expected to be established by year 13. Continued monitoring after 13 years under the detailed plan will be the responsibility of the non-federal sponsor.

5.7 SUMMARY OF COSTS

Table 5-3 presents the summary of costs for the tentatively recommended plan.

Table 5-3
Summary of Costs

Summary of Costs for the Tentatively Recommended Plan (Alternative 2) (October 2001 Price Levels)	
Lands & Damages	\$18,135,000
Relocations	\$0
Levees and Floodwalls/Monitoring	\$36,023,300
Dredged Material Placement	\$80,841,400
Adaptive Management	\$710,500
Preconstruction, Engineering & Design (PED)	\$2,000,000
Construction Management (S&A and E&D)	\$4,780,000
Recreation Features	\$1,665,000
Total First Cost	\$144,155,100
Interest During Construction	\$18,263,400
Total Investment Cost	\$162,418,500
Average Annual Cost (@6 1/8 %)	\$ 8,354,000
Other OMRR &R Costs	\$ 288,200
Total Annual Cost	\$ 8,642,200

5.7.1. Basis of Cost

The Corps of Engineers' Micro Computer Aided Cost Estimating System (MCACES) will be used to develop the construction cost of the BMK expansion project. The estimated costs presented in this report are based on October 2001 price levels, a 50-year period of analysis and the present Federal Discount Rate of 6.125 percent. This estimate is based on the Administrative Draft - Supplemental Environmental Impact Report/Environmental Impact Statement (SEIR/EIS) to the Hamilton Wetland Restoration Plan EIS/EIR for the Bel Marin Keys Unit V Wetland Restoration Project and the Hamilton Wetland Woodward-Clyde concept plan, reference "Hamilton Wetlands Conceptual Restoration Plan" and "Technical Appendices", prepared by Woodward-Clyde for the State Coastal Conservancy, the City of Novato, April 24, 1998.

5.7.1.1 Project Phasing

PED Phase: The Pre-construction, Engineering, and Design Phase will take approximately 18 to 24 months to complete.

Phase 1: The majority of work for this project is the levee construction which will take approximately two years to construct. This involves site preparation for the placement of dredged material. It also includes hydroseeding levees. While the project start date is scheduled to begin FY 2001, this phase could be accelerated through authorization and/or a congressional add.

Phase 2: The placement and grading of dredged material to create wetland would take approximately four to five years.

Phase 3: Lowering levee, breaching levee, construction of the outboard marsh channels, and weir structures removal is expected to take a maximum of one year to complete. Monitoring, maintenance, and adaptive management would take place over a 12 year period.

5.7.1.2 Pricing

Estimated costs are based on a July 1998 price level. Plant and equipment costs are from EP 1110-1-8 "Construction Equipment Ownership and Operating Expense Schedule, Region 7" 1997 database, "Unit Price Book" (UPB) 1997 database, and "National Labor Rates" 1997 database supplied with the MCACES program. The national labor rates are adjusted to State of California Wage Rate Determination sheets by adjusting the national rates upwards by 20%. The material prices from the UPB are adjusted upwards 20% to account for California (San Rafael) locality. Material costs are from the MCACES databases, publications and previous studies. Cost estimates from the Woodward-Clyde concept plan are also used in the MCACES estimate.

5.7.1.3 Contract Work

It was assumed that the prime contractor will perform all features of work, 5 days a week, 8 hours per day.

5.7.1.4 Levee Construction

New Levees with Bench:	13,300 linear feet for Alternative 1 15,200 linear feet for Alternative 2 11,400 linear feet for Alternative 3
Improved Levees/Berms:	37,500 linear feet for Alternative 1 35,700 linear feet for Alternative 2 8,800 linear feet for Alternative 3
Phase Containment Levees:	30,400 linear feet for Alternative 1 20,500 linear feet for Alternative 2 6,500 linear feet for Alternative 3
Internal Peninsulas/Berms:	15,800 linear feet for Alternative 1 17,900 linear feet for Alternative 2 26,500 linear feet for Alternative 3
Pilot Channel Excavation:	2,100 linear feet for Alternative 1 1,800 linear feet for Alternative 2 1,200 linear feet for Alternative 3

Material for levee construction would be obtained by excavating borrow material at a depth of 2 feet from designated areas within the BMK site. Material would be placed, compacted and shaped to form levees at the designated footprints. Cross-sections used in this estimate were estimated for the Hamilton Wetland Restoration Feasibility Report.

5.7.1.5 Breaching of the levees

Breaching of the existing bayward levee and the existing levee occurs along the Novato Creek for alternatives 1 and 2. Breaching of the existing bayward levee occurs in alternative 3 only.

5.7.1.6 Weir and Culvert structures

Existing weirs inadequate to provide the desired flow of water will be removed and replaced with more adequate weirs. Construction of new culverts with flapgates will provide for the transfer of water from existing water sources into the newly created wetland or from newly created upland transition area to the newly tidal marsh area.

5.7.1.7 Building Demolition

The building demolition would consist of demolition, removal and disposal of buildings composed primarily of wood materials. Buildings range from 1000 square feet to 10,000 square feet. Costs were determined using R.S. Means, Heavy Construction Cost Data and other historical data.

5.7.1.8 Mobilization and Demobilization

Assume all land based plant and equipment is available locally and mobilization would take 8 hours and demobilization would take 8 hours.

5.7.1.9 Monitoring

Monitoring consists of initial and final fill elevations for dredged material placement using resistivity staffs and remote monitoring equipment similar to Sonoma Baylands project. The cost is from the HWRP Feasibility Report cost estimate, and the Woodward-Clyde concept report.

5.7.1.10 Finish Grading

Finish grading of the dredged material consists of mixing the top 2' of dredged material placement to prevent complete dessication and cracking of the top layer. It is assumed that the dredging contractors will deposit 1' of sand 1' below the final elevation and 1' of fine-grained material at the final elevation.

5.7.1.11 Monitoring Costs

Long term monitoring costs of the dredge material placed is the estimated cost of monitor placement of the material over a period of approximately 15 years. Costs consists of monitor and maintenance of the levees, water control structures, tidal channel depth; aerial photos, transects monitoring, biological monitoring, water quality, and sedimentation surveys for a period of 13 years.

5.7.1.12 PG&E Towers

Existing PG&E towers within the newly created marsh areas require operation and maintenance. The costs include concrete encasement of the tower legs at the base as well as construction of a levee access to the towers. The costs were referenced from Sonoma Baylands wetlands restoration project done in 1994.

5.7.1.13 NSD Outfall Pipeline Modifications

Alternatives 1 and 3 require the modification of the existing outfall pipeline through the construction of a new section of pipeline around the perimeter of Pacheco pond. Costs were estimated based upon the existing cost for the pipeline per foot of line.

5.7.1.14 Bay Trail and Interpretive Center

Costs include the construction of the a new bay trail along the perimeter of the new wetland, a new interpretive center and a parking lot.

5.7.1.15 Adaptive Management

The cost for adaptive management monitoring for the development of the wetland is estimated at 2% of the cost for the levee construction.

5.7.1.16 Hydroseed of Levees: Hydroseeding was estimated based on the unit costs in the HWRP Feasibility Report.

5.7.1.17 Real Estate Costs

Developed by Susan Miller, Carolyn Meza, and Gayle Hayes, Real Estate Division, SPK.

5.7.1.18 Planning, Engineering and Design (PED, Construction Management (S&A) and Engineering and Design (E&D)

PED, S&A and E&D costs were estimated based upon the estimate in the HWRP Feasibility report.

5.7.1.19 MCACES Assumptions

12% overhead, 8% profit, 1% bond, 20% locality, 20% contingency. Escalation of the various cost categories, ie Levees and Floodwalls, Navigation and Harbors and Building were escalated from 1Q99 (1998) to 3Q02 (2001) according to the Civil Works Construction Cost Index System. (CWCCIS).

5.7.2 Interest During Construction

The Corps has accounted for the opportunity cost of capital used during the construction phase of project implementation. The calculation of Interest During Construction (IDC) is used to determine the total investment costs of a project. The IDC costs are added to the actual project costs to account for the total project cost. Project costs include: construction, lands, easements, rights-of-way; relocations and damages, utility relocations; engineering and design, supervision and administration; and contingencies. The IDC was calculated using the present Federal Discount Rate of 6.125 percent (FY02), and was applied to the first five years required to complete construction of the BMK component of the total combined HWRP/BMK project. Benefits will have accrued upon completion of the HWRP portion of the project and the first two cells of the BMK addition, making IDC unnecessary for the final three years of the 16-year project construction period.

5.7.3 Cost Apportionment and Allocation

Costs associated with the alternatives are allocated to environmental restoration and recreation. The sponsor is responsible for providing all Lands, Easements, Rights of Way, Relocations and Disposal Sites (LERRDS), 50% of the costs associated with recreation features, and any cash contributions that may be required to bring the local share up to 25% of the total project cost associated with restoration features. The Federal and non-Federal share of project costs and the breakdown by project phase is presented in Chapter 6.

The major recreation features of the tentatively recommended plan and their approximate costs are listed below:

- | | | |
|----|-------------------------|--------------|
| 1) | Interpretive center | (\$ 850,000) |
| 2) | Detached restroom | (\$ 150,000) |
| 3) | Display Board/kiosk | (\$ 32,000) |
| 4) | Parking lot (20 spaces) | (\$ 33,000) |
| 5) | Trail | (\$ 600,000) |

With the exception of the interpretive center, inclusion of these recreation features is consistent with Corps policy regarding recreation development at ecosystem restoration projects; therefore the detached restroom, the display board/kiosk, the parking lot and the trail will be cost-shared at a rate of 50% Federal, 50% non-Federal. As a betterment, the cost of the interpretive center will be the responsibility of the non-Federal sponsor.

If an alternate trail alignment that includes trail segments located off project lands required for restoration is selected, then those segments of the trail would also be considered a betterment and would not be eligible for Federal cost-sharing.

5.8 RISK AND UNCERTAINTY

5.8.1 Uncertainty in Projections

Rate of Sedimentation

The timeframe for the evolution of wetland habitats on the site depends on the rate of natural sedimentation after breaching and re-introduction of tidal action. The actual rate of sedimentation realized is uncertain for several reasons. First, the volume of suspended sediments in San Pablo Bay waters exhibits large spatial and temporal variability. A long-term integrated data set of sediment rates is not available for this location. Project design relied on observed sedimentation rates from other shoreline locations and episodic sampling of suspended sediment loads in San Pablo Bay. Therefore, the actual concentration of suspended sediments in the tidal prism entering the expanded HWRP will not be known with certainty prior to breaching the site.

Secondly, the pattern of *net* sediment deposition on the site will depend on the interaction of sediment deposition and resuspension that depends, in turn, on tidal currents, wind and wave action, site design and the pattern of colonization by vegetation. These dynamics would be very difficult to model accurately for such a large site, even if the volume of sediments entering the site were known with certainty. Therefore, conservative estimates were used for deposition in the site using hydrodynamic modeling and derived sedimentation curves. A basic assumption was made that sediment deposition rates would be higher at the front of the site near the sediment-rich tidal inlets, and lower in the distal areas of the restored tidal marsh.

Sources of Material

There are a wide range of potential dredging projects that could be used to construct site features the expanded HWRP. As part of the PED phase of the existing HWRP project, potential contributing dredging projects and anticipated supply schedules were developed. Based on this analysis, there is an adequate volume of dredged material that can feasibly be used to construct Hamilton site features. Please refer to Appendix D for a schedule of material to be delivered to the HWRP/BMKV project by each participating navigation project.

1) New Work. New work projects are desirable because they can provide large volumes of material rapidly and have better economies of scale and funding. The new work projects proposed in the region were evaluated for their feasibility and costs. Deepening projects at the Port of Oakland, Pinole Shoal, and Redwood City were

tentatively recommended because they have a strong feasibility of implementation during the construction of HWRP and because they appear to be cost-effective for use at HWRP.

2) Maintenance Dredging. Although maintenance dredging volumes are lower per episode than new work projects, they are dredged on a more predictable basis than deepening projects. The feasibility analysis used the larger Corps and private maintenance projects in Central Bay and San Pablo Bays. This analysis showed there is an adequate volume of material to construct the site. However, even if some of these projects are not subsequently available there are other maintenance projects that could be used instead. The plan proposes that all feasible Bay dredging projects with suitable material during the construction period will be used for Hamilton construction.

5.8.2 Monitoring Evaluation

The lengthy period of time required for the marsh plain to be developed necessitates a long term monitoring program. A typical five year monitoring period is unlikely to be sufficient in measuring the ultimate success of the restoration project. Therefore, as previously indicated a 13 year monitoring and adaptive management program will be implemented on the expanded project. To reduce monitoring costs, periodic evaluations could be conducted to assess ongoing monitoring needs. Monitoring efforts could be reduced or eliminated as success criteria are met. In addition, more efficient methods of monitoring could be incorporated as familiarity with the site develops. Monitoring and evaluation would be developed further in PED as design elements are more clearly defined.

5.9 PROJECT IMPLEMENTATION

5.9.1 Construction Funding

The schedule for implementation of project expansion assumes re-authorization in WRDA 2002. After project reauthorization, the expanded project would be eligible for construction funding in FY 2003. The project would be considered for inclusion in the President's budget based on national priorities, magnitude of the Federal commitment, economic and environmental feasibility level of local support, willingness of the non-Federal sponsor to fund its share of the project cost and budgetary constraints that may exist at the time of funding. Once Congress appropriates Federal construction funds, the Corps and the non-Federal sponsor would modify the existing project cooperation agreement (PCA). This modified PCA would define the Federal and non-Federal responsibilities for implementing, operating, and maintaining the project, and is scheduled for execution in FY 2003.

5.9.2 Construction Sequencing

The preferable construction sequencing for the combined HWRP/BMK-V project would be to start and complete construction of the wetland and upland habitat areas on the Hamilton Army Airfield and then begin construction on the combined BMK-V and State

Land Commission parcel areas. The two main reasons this sequence is preferable are that the Novato Sanitary District outfall pipeline access berm will physically and hydraulically divide these project areas and the sandy dredged material from the Port of Oakland –50 foot Deepening Project, due to arrive in 2005-2006, is the preferable material for constructing the deep fills required in the seasonal wetland areas of the Hamilton Army Airfield.

However, this preferable construction sequence for the combined project may not be viable if there are delays in the BRAC action on the Hamilton Army Airfield and FUDS action on the State Land Commission parcel. Therefore, four alternative construction sequences were developed to demonstrate that the combined project could be constructed effectively with or without completion of the BRAC or FUDS. The BRAC action affects only the Hamilton Army Airfield parcel and the FUDS action affects only the State Land Commission parcel.

Construction Sequence A – BRAC Transfers and FUDS is Completed

This sequence assumes that both the BRAC parcel transfer and the FUDS action are completed in a timely manner. Please see Figure 5-1. Area 1- the tidal wetlands on the Hamilton Army Airfield are constructed from 2004 to 2006, primarily with O&M dredged material. Area 1 would likely be breached to tidal action in 2007 or 2008. Area 2 - the seasonal wetlands on Hamilton Army Airfield and the Navy Ball Fields parcels are constructed from 2005 to 2006, primarily with dredged materials from the Port of Oakland –50 foot Deepening Project. Area 3 - the seasonal wetland areas in BMK-V are constructed from 2007 to 2009, primarily with O&M dredged materials. Area 4 - the northern tidal wetland cell at BMK-V is constructed from 2010 to 2012, primarily with O&M dredged materials. Area 4 would likely be breached to tidal action in 2013 or 2014. Area 5 - the southern tidal wetlands cell at BMK-V and the State Lands Commission parcel is constructed from 2012 to 2015, primarily with O&M dredged materials. Area 5 would likely be breached to tidal action in 2016 or 2017.

Construction Sequence B - No Transfer of BRAC or Completion of FUDS

This sequence assumes that both the BRAC parcel transfer and the FUDS action are not completed in a timely manner and no construction occurs on these areas. Therefore, BMK-V parcel is constructed without the Hamilton Army Airfield, Navy Ball Fields or State Lands Commission parcels. Please see Figure 5-2. Area 1- the seasonal wetlands on the BMK-V parcel are constructed from 2004 to 2006, primarily with O&M dredged material and dredged materials from the Port of Oakland –50 foot Deepening Project. Area 2 - the northern tidal wetland cell at BMK-V is constructed from 2006 to 2008, primarily with O&M dredged materials. Area 2 would likely be breached to tidal action in 2009 or 2010. Area 3 - the southern tidal wetlands cell at BMK-V (without the State Lands Commission parcel) is constructed from 2008 to 2010, primarily with O&M dredged materials. Area 3 would likely be breached to tidal action in 2011 or 2012.

The Hamilton Army Airfield, Navy Ball Fields and State Lands Commission parcels could be constructed independently, after completion of the BMK-V parcel, when the BRAC and FUDS actions are completed and the BRAC property transferred to the SCC.

Construction Sequence C – FUDS Completed, No Transfer of BRAC

This sequence assumes that the BRAC parcel transfer is not completed in a timely manner and no construction occurs on this area. Therefore, BMK-V and State Lands Commission parcels are constructed without the Hamilton Army Airfield or Navy Ball Fields parcels. Please see Figure 5-3. Area 1- the seasonal wetlands on the BMK-V parcel are constructed from 2004 to 2006, primarily with O&M dredged material and dredged materials from the Port of Oakland –50 foot Deepening Project. Area 2 - the northern tidal wetland cell at BMK-V is constructed from 2006 to 2008, primarily with O&M dredged materials. Area 2 would likely be breached to tidal action in 2009 or 2010. Area 3 - the southern tidal wetlands cell at BMK-V with the State Lands Commission parcel is constructed from 2008 to 2011, primarily with O&M dredged materials. Area 3 would likely be breached to tidal action in 2012 or 2013.

The Hamilton Army Airfield and Navy Ball Fields parcels could be constructed independently, after completion of the BMK-V and State Lands Commission parcels, when the BRAC action was completed and the property transferred to the SCC.

Construction Sequence D – BRAC Transfers, FUDS Not Completed

This sequence assumes that the BRAC action is completed and the parcel transferred, however the FUDS action is not completed in a timely manner. Please see Figure 5-4. Area 1- the tidal wetlands on the Hamilton Army Airfield are constructed from 2004 to 2006, primarily with O&M dredged material. Area 1 would likely be breached to tidal action in 2007 or 2008. Area 2 - the seasonal wetlands on Hamilton Army Airfield and the Navy Ball Fields parcels are constructed from 2005 to 2006, primarily with dredged materials from the Port of Oakland –50 foot Deepening Project. Area 3 - the seasonal wetland areas in BMK-V are constructed from 2007 to 2009, primarily with O&M dredged materials. Area 4 - the northern tidal wetland cell at BMK-V is constructed from 2010 to 2012, primarily with O&M dredged materials. Area 4 would likely be breached to tidal action in 2013 or 2014. Area 5 - the southern tidal wetlands cell at BMK-V (without the State Lands Commission parcel) is constructed from 2012 to 2014, primarily with O&M dredged materials. Area 5 would likely be breached to tidal action in 2015 or 2016.

The State Lands Commission parcel could be constructed independently, after completion of the Hamilton Army Airfield, Navy Ball Fields and BMK-V parcels, when the FUDS action is completed. However, due to very limited land access, along the NSD outfall pipeline access road the completion of FUDS and habitat restoration work on this site would likely be problematic and expensive.

5.9.3 Financial Capability of the Sponsor

The objective of this analysis is to conduct an initial financial assessment of the non-federal sponsor for the expansion of the HWRP to include BMK. This initial assessment is intended to demonstrate that the cost sharing partner, the SCC, has successfully met its financial commitments in the past, has a variety of funding sources available to it, and has the capacity to ensure that the non-federal portion of the project funds will be available.

The total project implementation cost estimate for the Bel Marin Keys portion of the tentatively recommended plan is estimated to be approximately \$149.5 million. Due to the unique relationship between HWRP and LTMS, the total project costs are shared among the non-Federal sponsor, the Federal government and navigation projects in the San Francisco Bay. Chapter 6 and Appendix A present the combined HWRP/BMK project costs and cost-sharing.

Prior Corps Cooperation

The Conservancy has successfully cooperated with the Corps of Engineers on several previous occasions. Both Sonoma Baylands and the Napa Salt Marsh projects were sponsored by the Conservancy. The financial obligation of the sponsor with regard to both of these projects has been met in a timely and comprehensive manner. They have also met all of their financial obligations with regard to cost sharing the authorized HWRP. The successful participation and financial performance of the local sponsor in these and other non-Corps projects indicates the Conservancy's good faith effort to meet its financial obligations.

Funding Sources

The Conservancy's operation and programs are funded through a variety of sources. The budget is financed primarily through the State of California's General Fund. In addition supplemental funding for specific projects can be obtained from a variety of alternative sources. In any given year, these funding sources can include the following revenue generating vehicles:

1. Habitat Conservation Fund: The Conservancy is legislatively mandated to receive funds accruing to the Habitat Conservation Fund.
2. CALFED: A state and federal program to fund water resource and environmental conservation projects. The conservancy receives funds from CALFED for restoration projects.
3. Private Foundations and Individual Donations: The conservancy applies for and receives grants from a variety of entities. Some of the recent foundations committing funds to the Conservancy are the Marin Community Foundation (MCF) and the Hewlett Foundation.

4. State Grants: The Conservancy can receive and disburse funds from other state grant programs for coastal resource projects.
5. General Obligation Bonds: General Obligation Bonds offer the Conservancy another source of funds when required. The Conservancy can issue Bonds to finance habitat restoration projects. These General Obligation Bonds must be approved by California voters.

Financial Capability -Conclusion

At this time the local sponsor has a satisfactory financial position. The current federal and state policy emphasis on environmental restoration has resulted in increased funding and expanding budgets for restoration oriented agencies. This expansion of funding has been reflected in the conservancy's budgets over the last several years and is likely to continue. In addition, the SCC's access to alternative funding sources as indicated above is strong. In aggregate, the local sponsor appears to have the financial wherewithal to provide the funds for the non-federal project cost. These funds may or may not derive from debt instruments. The actual funding mechanism or combination of funding mechanisms to be used by the local sponsor will be determined before the PCA is modified.

5.9.4 Permits

Prior to project construction, the Corps would demonstrate that the project complies with the Clean Water Act. Project requirements would be coordinated with the RWQCB for compliance with requirements of the Act.